Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3131307 Date:10-12-2024

Subject Name: Basics of Environmental Hydraulics

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define & Explain (i) Specific gravity (ii) Capillarity (iii) Mass density	**03**
	(b)	Distinguish dynamic viscosity and kinematic viscosity. State their unit.	**04**
	(c)	Derive an expression for Bernoulli's equation and mention the Assumptions.	**07**
Q.2	**(a)**	Define the term: Pitot tube.	**03**
	(b)	Explain the U-tube Differential manometer.	**04**
	(c)	State and prove the Pascal's law.	**07**
		OR	
	(c)	Derive an expression for the discharge through an Orifice meter.	**07**
Q.3	**(a)**	Define HGL and TEL	**03**
	(b)	An oil of kinematic viscosity 0.6 stoke is flowing through a pipe of 31 cm diameter at a rate of 321 liter per second. Find the head loss due to friction for the pipe length of 60 m.	**04**
	(c)	List the minor losses and Derive formula for calculating loss of head due to sudden Contraction.	**07**
		OR	
Q.3	**(a)**	Define Static Pressure and Dynamic Pressure.	**03**
	(b)	Determine the diameter of a pipe of length 2550 m when the rate of flow of water through the pipe is 230 lit/s and the head loss due to friction is 6 m. Take the value of C = 60 in Chezy's formula.	**04**
	(c)	Derive a Darcy Weisbach equation for Head Loss due to friction in pipe.	**07**
Q.4	**(a)**	Define Co-efficient of Discharge and Co-efficient of Velocity.	**03**
	(b)	A submarine fitted with a pitot tube moves horizontally in sea. Its axis is 12.5 m below the surface of the water. The pitot tube fixed in front of the submarine and along its axis is connected to the two limbs of a U-tube containing mercury, the reading of which is found to be 201 mm. find the speed of the submarine. Take the specific gravity of sea water = 1.025 times fresh water.	**04**
	(c)	Derive an expression for time of emptying a tank through an orifice of rectangular tank.	**07**
		OR	
Q.4	**(a)**	Classification of orifice.	**03**
	(b)	Water flows at the rate of 0.016 m^3/s through a 101 mm diameter orifice used in a 201 mm pipe. What is the difference in pressure head between the upstream section and venacontracta section? Take co-efficient of contraction $C_c = 0.6$ and $C_v = 1$.	**04**
	(c)	Derive an expression for time of emptying a tank through an orifice of circular horizontal tank.	**07**

Q.5	**(a)**	Define notches and weirs.	**03**
	(b)	Write short note on Pipes in compound pipes.	**04**
	(c)	What do you mean by "Most economical section" of an open channel? How it is determined?	**07**

OR

Q.5	**(a)**	Define Vena-contracta and co-efficient of contraction.	**03**
	(b)	Distinguish between Notches and Weirs.	**04**
	(c)	Derive an expression for the discharge over a Triangular notch or weir.	**07**

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